TOPIC: 192002
KNOWLEDGE: K1.07 [3.1/3.1]
QID: P44 (B186)

The operator has just pulled control rods and changed the effective multiplication factor (K_{eff}) from 0.998 to 1.002. The reactor is:

A. prompt critical.

B. supercritical.

C. exactly critical.

D. subcritical.

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.07 [3.1/3.1]
QID: P445 (B247)

Which one of the following conditions describes a nuclear reactor that is exactly critical?

A. $K_{eff} = 0$; $\Delta K/K = 0$

B. $K_{eff} = 0$; $\Delta K/K = 1$

C. $K_{eff} = 1$; $\Delta K/K = 0$

D. $K_{eff} = 1$; $\Delta K/K = 1$

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.08 [2.6/2.6]
QID: P45

The ratio of the number of neutrons in one generation to the number of neutrons in the previous generation is the...

A. effective multiplication factor.

B. fast fission factor.

C. neutron nonleakage factor.

D. neutron reproduction factor.

ANSWER: A.

TOPIC: 192002
KNOWLEDGE: K1.08 [2.6/2.6]
QID: P1346 (B1447)

The effective multiplication factor (K_{eff}) can be determined by dividing the number of neutrons produced from fission in the third generation by the number of neutrons produced from fission in the ____________ generation.

A. first

B. second

C. third

D. fourth

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.08 [2.6/2.6]
QID: P1846 (B847)

The effective multiplication factor (K_{eff}) describes the ratio of the number of fission neutrons at the end of one generation to the number of fission neutrons at the __________ of the __________ generation.

A. end; previous

B. beginning; next

C. beginning; previous

D. end; next

ANSWER: A.

TOPIC: 192002
KNOWLEDGE: K1.08 [2.6/2.6]
QID: P2046

A reactor is shutdown with the reactor vessel head removed for refueling. The core is covered by 23 feet of water at a temperature of 100°F and a boron concentration of 2,000 ppm.

Which one of the following will increase K_{eff}?

A. An unrodded spent fuel assembly is removed from the core.

B. Refueling water temperature increases to 105°F.

C. A new neutron source is installed in the core.

D. Excore nuclear instrumentation is repositioned to increase source range count rate.

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.08 [2.6/2.6]
QID: P2647 (B2647)

A thermal neutron is about to interact with a U-238 nucleus in an operating reactor core. Which one of the following describes the most likely interaction and the effect on core K_{eff}?

A. The neutron will be scattered, thereby leaving K_{eff} unchanged.

B. The neutron will be absorbed and U-238 will undergo fission, thereby decreasing K_{eff}.

C. The neutron will be absorbed and U-238 will undergo fission, thereby increasing K_{eff}.

D. The neutron will be absorbed and U-238 will undergo radioactive decay to Pu-239, thereby increasing K_{eff}.

ANSWER: A.

TOPIC: 192002
KNOWLEDGE: K1.08 [2.6/2.6]
QID: P2746 (N/A)

A reactor is shutdown with the reactor vessel head removed for refueling. The core is covered by 23 feet of water at a temperature of 105°F and a boron concentration of 2200 ppm.

Which one of the following will increase core K_{eff}?

A. A new neutron source is installed in the core.

B. Refueling water temperature decreases to 100°F.

C. A spent fuel assembly is replaced with a new fuel assembly.

D. Excore nuclear instrumentation is repositioned to increase source range count rate.

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.08 [2.6/2.6]
QID: P3046 (B3147)

A reactor plant is currently operating at equilibrium 80% power near the end of its fuel cycle. During the next 3 days of equilibrium power operation no operator action is taken.

How will core K_{eff} be affected during the 3-day period?

A. Core K_{eff} will gradually increase during the entire period.

B. Core K_{eff} will gradually decrease during the entire period.

C. Core K_{eff} will tend to increase, but inherent reactivity feedback will maintain K_{eff} at 1.0.

D. Core K_{eff} will tend to decrease, but inherent reactivity feedback will maintain K_{eff} at 1.0.

ANSWER: D.

TOPIC: 192002
KNOWLEDGE: K1.09 [2.5/2.7]
QID: P546

During core refueling, burnable poisons are often installed in the core to help control K_{excess}. Why are more burnable poison rods installed during fuel load for the first fuel cycle than for subsequent fuel cycles?

A. Control rod worth is lower at the beginning of subsequent fuel cycles.

B. More fuel reactivity is present at the beginning of subsequent fuel cycles.

C. More fission product poisons are present at the beginning of subsequent fuel cycles.

D. Reactor coolant boron concentration is higher at the beginning of subsequent fuel cycles.

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.09 [2.5/2.7]
QID: P646 (B1848)

Select the equation that defines K-excess (excess reactivity).

A. $K_{eff} + 1$

B. $K_{eff} - 1$

C. $K_{eff}(1\text{-SDM})$

D. $1/(1-K_{eff})$

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.09 [2.5/2.7]
QID: P946 (N/A)

Which one of the following combinations of critical core conditions indicates the <u>most</u> excess reactivity exists in the core?

	CONTROL ROD POSITION	RCS BORON CONCENTRATION
A.	25% inserted	500 ppm
B.	50% inserted	500 ppm
C.	25% inserted	1000 ppm
D.	50% inserted	1000 ppm

ANSWER: D.

TOPIC: 192002
KNOWLEDGE: K1.09 [2.5/2.7]
QID: P1147 (N/A)

The following are combinations of critical conditions that exist for the same reactor operating at the point of adding heat at different times in core life. Which one of the following combinations indicates the <u>least</u> amount of excess reactivity present in the core?

CONTROL ROD POSITION	RCS BORON CONCENTRATION
A. 25% inserted	500 ppm
B. 25% inserted	1000 ppm
C. 50% inserted	500 ppm
D. 50% inserted	1000 ppm

ANSWER: A.

TOPIC: 192002
KNOWLEDGE: K1.09 [2.5/2.7]
QID: P1246 (B2048)

Which one of the following is a reason for installing excess reactivity (K_{excess}) in the core?

A. To compensate for burnout of Xe-135 and Sm-149 during power changes.

B. To ensure reactor coolant boron concentration is low enough to maintain a negative moderator coefficient.

C. To compensate for the negative reactivity added by the power coefficient during a power increase.

D. To compensate for the conversion of U-238 to Pu-239 over core life.

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.09 [2.5/2.7]
QID: P2847 (B2747)

A reactor is operating at full power at the beginning of a fuel cycle. A neutron has just been absorbed by a U-238 nucleus at a resonance energy of 6.7 electron volts.

Which one of the following describes the most likely reaction for the newly formed U-239 nucleus and the effect of this reaction on K_{excess}?

A. Decays over several days to Pu-239, which increases K_{excess}.

B. Decays over several days to Pu-240, which increases K_{excess}.

C. Immediately undergoes fast fission, which decreases K_{excess}.

D. Immediately undergoes thermal fission, which decreases K_{excess}.

ANSWER: A.

TOPIC: 192002
KNOWLEDGE: K1.09 [2.5/2.7]
QID: P3547 (B3547)

Which one of the following is a benefit of installing excess reactivity (K_{excess}) in a reactor core?

A. Ensures that sufficient control rod negative reactivity is available to shut down the reactor.

B. Ensures that the reactor can be made critical during a peak xenon condition after a reactor scram.

C. Ensures that positive reactivity additions result in controllable reactor power responses.

D. Ensures that the U-235 fuel enrichment is the same at the beginning and the end of a fuel cycle..

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.10 [3.2/3.6]
QID: P127

Shutdown margin is the actual amount of reactivity...

A. inserted by burnable poisons at beginning of life.

B. due to dissolved boron in the reactor coolant system.

C. by which the reactor is subcritical.

D. which would be inserted by shutdown bank rods.

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.10 [3.2/3.6]
QID: P245 (B248)

When determining shutdown margin for an operating reactor, how many control rods are assumed to remain fully withdrawn?

A. A single control rod of the highest reactivity worth

B. A symmetrical pair of control rods of the highest reactivity worth

C. A single control rod of average reactivity worth

D. A symmetrical pair of control rods of average reactivity worth

ANSWER: A.

TOPIC: 192002
KNOWLEDGE: K1.10 [3.2/3.6]
QID: P345

With a plant operating at 85% power and rod control in Manual, the operator borates 10 ppm. Assuming reactor power does not change, shutdown margin will...

A. decrease and stabilize at a lower value.

B. decrease, then increase to the original value as coolant temperature changes.

C. increase and stabilize at a higher value.

D. increase, then decrease to the original value as coolant temperature changes.

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.10 [3.2/3.6]
QID: P746

With a plant operating at 75% power and rod control in Manual, the operator dilutes reactor coolant system (RCS) boron by 5 ppm to adjust RCS temperature. Assuming reactor power does not change, shutdown margin will...

A. increase and stabilize at a higher value.

B. increase, then decrease to the original value as coolant temperature changes.

C. decrease and stabilize at a lower value.

D. decrease, then increase to the original value as coolant temperature changes.

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.10 [3.2/3.6]
QID: P1747

A plant is operating with the following initial conditions:

Reactor power is 50%
Rod control is in manual
Reactor coolant system (RCS) boron concentration is 600 ppm

Disregarding the effects of fission product poisons, which one of the following will result in a decrease in stable shutdown margin?

A. Reactor power is reduced to 45% with final RCS boron concentration at 620 ppm.

B. Reactor power is increased to 55% with final RCS boron concentration at 580 ppm.

C. Control rods are withdrawn 3 inches with no change in steady-state reactor power or RCS boron concentration.

D. Control rods are inserted 3 inches with no change in steady-state reactor power or RCS boron concentration.

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.10 [3.2/3.6]
QID: P2347 (B2348)

Which one of the following core changes will <u>decrease</u> shutdown margin? Assume no operator actions.

A. Depletion of fuel during reactor operation

B. Depletion of burnable poisons during reactor operation

C. Buildup of Sm-149 following a reactor power transient

D. Buildup of Xe-135 following a reactor power transient

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.10 [3.2/3.6]
QID: P2546

A plant is operating at 100% power with rod control in Manual. If no operator action is taken, then during the next two weeks of steady-state operation at 100% power shutdown margin will...

A. continuously decrease

B. initially decrease, then return to the same value due to changing coolant temperature.

C. continuously increase

D. initially increase, then return to the same value due to changing coolant temperature.

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.11 [2.9/3.0]
QID: P46

Reactivity is defined as the...

A. fractional change in neutron population per generation.

B. number of neutrons by which neutron population changes per generation.

C. rate of change of reactor power in neutrons per second.

D. change in the number of neutrons per second that causes a fission event.

ANSWER: A.

TOPIC: 192002
KNOWLEDGE: K1.11 [2.9/3.0]
QID: P846

Which term is described by the following?

"The fractional change of the effective multiplication factor from criticality."

A. 1/M

B. K_{eff}

C. Reactor period

D. Reactivity

ANSWER: D.

TOPIC: 192002
KNOWLEDGE: K1.12 [2.4/2.5]
QID: P130

With K_{eff} = 0.985, how much reactivity must be added to make the reactor critical?

A. 1.48% $\Delta K/K$

B. 1.50% $\Delta K/K$

C. 1.52% $\Delta K/K$

D. 1.54% $\Delta K/K$

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.12 [2.4/2.5]
QID: P446 (B1548)

With core K_{eff} equal to 0.987, how much reactivity must be added to make a reactor exactly critical? (Answer options are rounded to the nearest 0.01% ΔK/K.)

A. 1.01% ΔK/K

B. 1.03% ΔK/K

C. 1.30% ΔK/K

D. 1.32% ΔK/K

ANSWER: D.

TOPIC: 192002
KNOWLEDGE: K1.12 [2.4/2.5]
QID: P1946 (B648)

In a subcritical reactor, K_{eff} was increased from 0.85 to 0.95 by rod withdrawal. Which one of the following is closest to the amount of reactivity that was added to the core?

A. 0.099 ΔK/K

B. 0.124 ΔK/K

C. 0.176 ΔK/K

D. 0.229 ΔK/K

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.12 [2.4/2.5]
QID: P2146 (B2848)

With K_{eff} = 0.982, how much positive reactivity is required to make the reactor critical?

A. 1.720% ΔK/K

B. 1.767% ΔK/K

C. 1.800% ΔK/K

D. 1.833% ΔK/K

ANSWER: D.

TOPIC: 192002
KNOWLEDGE: K1.12 [2.4/2.5]
QID: P2447 (B1947)

With K_{eff} = 0.985, how much positive reactivity is required to make the reactor exactly critical?

A. 1.487% ΔK/K

B. 1.500% ΔK/K

C. 1.523% ΔK/K

D. 1.545% ΔK/K

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.12 [2.4/2.5]
QID: P3347 (B748)

With K_{eff} equal to 0.983, how much reactivity must be added to make the reactor exactly critical? (Round answer to nearest 0.01% ΔK/K.)

A. 1.70% ΔK/K

B. 1.73% ΔK/K

C. 3.40% ΔK/K

D. 3.43% ΔK/K

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.13 [3.5/3.7]
QID: P246

A reactor at the end of core life has been shut down from 100% power and cooled down to 140°F over three days. During the cooldown, boron concentration was increased by 100 ppm. Given the following absolute values of reactivities added during the shutdown and cooldown, assign a (+) or (-) as appropriate and choose the current value of shutdown margin.

Control rods	= ( ) 6.918% ΔK/K
Xenon	= ( ) 2.675% ΔK/K
Power defect	= ( ) 1.575% ΔK/K
Boron	= ( ) 1.040% ΔK/K
Temperature	= ( ) 0.500% ΔK/K

A. -8.558% ΔK/K

B. -6.358% ΔK/K

C. -3.208% ΔK/K

D. -1.128% ΔK/K

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.13 [3.5/3.7]
QID: P346

A reactor was operating at steady-state 100% power with all control rods fully withdrawn and RCS T_{ave} at 588°F when a reactor trip occurred.

After the trip T_{ave} stabilized at 557°F and all control rods were verified to be fully inserted.

Given the following information, select the post-trip value of shutdown margin. (Assume no operator actions and disregard any reactivity effects of xenon.)

Power coefficient	= -0.015% ΔK/K/% power
Control/regulating rod worth	= -2.788% ΔK/K
Shutdown/safety rod worth	= -4.130% ΔK/K
Moderator temperature coefficient	= -0.0012% ΔK/K per °F

A. -5.381% ΔK/K

B. -5.418% ΔK/K

C. -8.383% ΔK/K

D. -8.418% ΔK/K

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.13 [3.5/3.7]
QID: P447

A reactor is operating at steady-state 90% power with all control rods fully withdrawn and T_{ave} at 580 °F. A reactor trip occurs, after which T_{ave} stabilizes at 550 °F and all rods are verified to be fully inserted.

Given the following information, calculate the value of shutdown margin. Assume no operator actions and disregard any reactivity effects of xenon.

Power coefficient	= -0.01% ΔK/K/% power
Control/regulating rod worth	= -2.788% ΔK/K
Shutdown/safety rod worth	= -4.130% ΔK/K
Moderator temperature coefficient	= -0.01% ΔK/K per °F

A. -5.718% ΔK/K

B. -6.018% ΔK/K

C. -7.518% ΔK/K

D. -7.818% ΔK/K

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.13 [3.5/3.7]
QID: P647

At the time of a reactor trip from 100% power, shutdown margin was determined to be -5.883% ΔK/K. Over the next 72 hours the reactor coolant system was cooled down and boron concentration was increased. The reactivities affected by the change in plant conditions are as follows:

Reactivity	Change (+ or -)
Xenon	2.675% ΔK/K
Moderator temperature	0.5% ΔK/K
Boron	1.04% ΔK/K

What is the shutdown margin 72 hours after the trip? (Assume end of core life.)

A. -1.668% ΔK/K

B. -3.748% ΔK/K

C. -7.018% ΔK/K

D. -9.098% ΔK/K

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.13 [3.5/3.7]
QID: P747

A reactor at end of life has been shut down from 100% power and cooled down to 140 °F over three days. During the cooldown, boron concentration was increased by 100 ppm.

Given the following absolute values of reactivities added during the shutdown and cooldown, assign a (+) or (-) as appropriate and choose the current value of shutdown margin.

Xenon	= ( ) 2.5% ΔK/K
Temperature	= ( ) 0.5% ΔK/K
Power defect	= ( ) 1.5% ΔK/K
Rods	= ( ) 7.0% ΔK/K
Boron	= ( ) 1.0% ΔK/K

A. -8.5% ΔK/K

B. -6.5% ΔK/K

C. -3.5% ΔK/K

D. -1.5% ΔK/K

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.13 [3.5/3.7]
QID: P1047

A reactor at end of core life has been shut down from 100% power and cooled down to 140 °F over three days. During the cooldown, boron concentration was increased by 100 ppm.

Given the following absolute values of reactivities added during the shutdown and cooldown, assign a (+) or (-) as appropriate and choose the current value of shutdown margin.

Coolant temperature	= ( ) 0.50% ΔK/K
Control rods	= ( ) 6.50% ΔK/K
Boron	= ( ) 1.50% ΔK/K
Power defect	= ( ) 1.75% ΔK/K
Xenon	= ( ) 2.75% ΔK/K

A. -0.0% ΔK/K

B. -3.0% ΔK/K

C. -3.5% ΔK/K

D. -8.5% ΔK/K

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.13 [3.5/3.7]
QID: P1446

A reactor at the beginning of core life has been shut down from 100% power and cooled down to 340 °F over three days. During the cooldown, boron concentration was increased by 200 ppm.

Given the following absolute values of reactivities added during the shutdown and cooldown, assign a (+) or (-) as appropriate and choose the current value of shutdown margin.

Xenon	= ( ) 3.0% ΔK/K
Boron	= ( ) 3.5% ΔK/K
Power defect	= ( ) 4.0% ΔK/K
Rods	= ( ) 7.0% ΔK/K
Cooldown	= ( ) 2.0% ΔK/K

A. -1.5% ΔK/K

B. -2.5% ΔK/K

C. -7.5% ΔK/K

D. -9.5% ΔK/K

ANSWER: A.

TOPIC: 192002
KNOWLEDGE: K1.13 [3.5/3.7]
QID: P1647

A reactor was operating at 100% power for two months when a reactor trip occurred. During the 14 hours since the trip the reactor has been cooled to 340°F and boron concentration has been increased by 200 ppm.

Given the following absolute values of reactivities added during the shutdown and cooldown, assign a (+) or (-) as appropriate and choose the current value of shutdown margin.

Xenon	= ( ) 2.0% ΔK/K
Boron	= ( ) 2.5% ΔK/K
Power defect	= ( ) 4.0% ΔK/K
Rods	= ( ) 7.0% ΔK/K
Cooldown	= ( ) 2.0% ΔK/K

A. -1.5% ΔK/K

B. -3.5% ΔK/K

C. -5.5% ΔK/K

D. -7.5% ΔK/K

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.14 [3.8/3.9]
QID: P124

Which one of the following plant parameter changes will result in an increase in shutdown margin for a shutdown reactor at end of core life?

A. Reactor coolant boron concentration is decreased by 100 ppm.

B. One control rod is fully withdrawn for a test.

C. Xenon has decayed for 72 hours following shutdown.

D. The reactor coolant system is allowed to heat up 30 °F.

ANSWER: D.

TOPIC: 192002
KNOWLEDGE: K1.14 [3.8/3.9]
QID: P547

A plant is operating at 70% power with manual rod control. Which one of the following conditions will increase shutdown margin? (Assume that no unspecified operator actions occur and the reactor does not trip.)

A. The reactor coolant system is diluted by 10 ppm.

B. A control rod in a shutdown bank (safety group) drops.

C. Power is decreased to 50% using boration.

D. The plant experiences a 3% load rejection.

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.14 [3.8/3.9]
QID: P2247

A reactor is operating at 80% power when the operator adds 10 gallons of boric acid to the reactor coolant system (RCS). Over the next several minutes, the operator adjusts control rod position as necessary to maintain a constant reactor coolant average temperature.

When the plant stabilizes, shutdown margin will be __________; and axial power distribution will have shifted toward the _________ of the core.

A. the same; top

B. the same; bottom

C. larger; top

D. larger; bottom

ANSWER: C.

TOPIC: 192002
KNOWLEDGE: K1.14 [3.8/3.9]
QID: P2547

A plant malfunction requires a rapid reactor power decrease from 100% to 90%. The crew hurriedly performs the downpower transient using control rod insertion when necessary. Reactor coolant boron concentration is not changed.

If the initial shutdown margin was 3.5% ΔK/K, which one of the following describes the shutdown margin at the lower power level? (Neglect any changes in core fission product reactivity.)

A. Less than 3.5% ΔK/K due only to the power defect.

B. Greater than 3.5% ΔK/K due only to the insertion of control rods.

C. Less than 3.5% ΔK/K due to the combined effects of control rod insertion and power defect.

D. Equal to 3.5% ΔK/K regardless of the reactivity effects of control rod insertion and power defect.

ANSWER: D.

TOPIC: 192002
KNOWLEDGE: K1.14 [3.8/3.9]
QID: P2747 (N/A)

Reactors A and B are identical except that reactor A is operating at steady-state 80% power while reactor B is operating at steady-state 100% power. Initial control rod positions are the same for each reactor.

How will the shutdown margins (SDM) compare for the two reactors following a reactor scram? (Assume no post-scram operator actions are taken that would affect SDM.)

A. Reactor A will have the greater SDM.

B. Reactor B will have the greater SDM.

C. When sufficient time has passed to allow both cores to become xenon-free, the SDMs will be equal.

D. Within a few minutes after the scrams, when all parameters have returned to normal post-scram conditions, the SDMs will be equal.

ANSWER: A.

TOPIC: 192002
KNOWLEDGE: K1.14 [3.8/3.9]
QID: P2947 (N/A)

A reactor is operating at steady-state 50% power. A plant test requires a 4°F decrease in reactor coolant system (RCS) average temperature (T-avg). The operator accomplishes this temperature decrease by adjusting RCS boron concentration. No other operator actions are taken.

If the initial shutdown margin was 3.0% ΔK/K, which one of the following describes the shutdown margin at the lower RCS T-avg with the reactor still at steady-state 50% power?

A. Less than 3.0% ΔK/K, because RCS T-avg is lower.

B. More than 3.0% ΔK/K, because RCS boron concentration is higher.

C. Equal to 3.0% ΔK/K, because the reactivity change caused by the change in RCS T-avg offsets the reactivity change caused by the change in RCS boron concentration.

D. Equal to 3.0% ΔK/K because shutdown margin in an operating reactor will <u>not</u> change unless control rod position changes.

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.14 [3.8/3.9]
QID: P3647 (B3648)

A reactor is initially operating at steady-state 60% power near the end of core life when a fully withdrawn control rod suddenly inserts completely into the core. No operator action is taken and the plant control systems stabilize the reactor at a power level in the power range.

Compared to the initial shutdown margin (SDM), the new steady-state SDM is ___________; compared to the initial 60% power core K_{eff}, the new steady-state core K_{eff} is ___________.

A. the same; smaller

B. the same; the same

C. less negative; smaller

D. less negative; the same

ANSWER: B.

TOPIC: 192002
KNOWLEDGE: K1.14 [3.8/3.9]
QID: P3747 (B3748)

A nuclear plant has just completed a refueling outage. Reactor engineers have predicted a control rod configuration at which the reactor will become critical during the initial reactor startup following the refueling outage based on the expected core loading. However, the burnable poisons scheduled to be loaded were inadvertently omitted.

Which one of the following describes the effect of the burnable poison omission on achieving reactor criticality during the initial reactor startup following the refueling outage?

A. The reactor will become critical before the predicted critical control rod configuration is achieved.

B. The reactor will become critical after the predicted critical control rod configuration is achieved.

C. The reactor will be unable to achieve criticality because the fuel assemblies contain insufficient positive reactivity to make the reactor critical.

D. The reactor will be unable to achieve criticality because the control rods contain insufficient positive reactivity to make the reactor critical.

ANSWER: A.